supplies the key-note by comparing some oil-sands with "fresh caviare" (p. 286).

In the chapter devoted to the geology, chemical composition and treatment of petroleum, the author is evidently less at home, and there are many statements to which exception might be taken. Thus the description of the structure of the Peruvian oil-fields (p. 53) is inaccurate, a series of anticlinals with intervening synclines being represented as a persistent monoclinal. The expression "concentration" (p. 59) for the flowing of oil to replace that which has been ejected with much solid matter in suspension is a novel one in this connection, and the same may be said of the terms "low density," "low resistance," and "high absorption," applied to the spaces vacated.

As the author fails to distinguish between benzene and benzine (pp. 132, 138), it is not surprising that he should assert that the frequency of association of petroleum with coal and lignite is "a source of speculation." Taking the Stock Exchange meaning of speculation this may be true, but the frequency, even of adventitious proximity, still less of any causal relationship, is an obsolescent fallacy which it is not worth while to controvert afresh.

As this purports to be a practical work on petroleum mining and oil-field development, it is regrettable that greater judgment has not been displayed in the selection of the illustrations. Many of the plates add, no doubt, to the attractiveness of the volume, but convey no instruction. Amongst these are the photographic illustrations of groups of specimens of oil-rocks, bitumens, &c., a "mud-volcano" showing a level surface on which walking is being cautiously attempted, and a cart laden with Trinidad pitch.

More care should have been exercised in proof-reading. Thus in the last line but one of p. 223 the word "for" should be "by," and, judging by the context, the word "not" has been omitted in the first line of the following page, the author being thus made to state the reverse of what he intended.

ESSAYS ON ANGLING.

Minor Tactics of the Chalk Stream, and Kindred Studies. By G. E. M. Skues. Pp. xii + 133. (London: Adam and Charles Black, 1910.) Price 3*s.* 6*d.* net.

IT is long since we have read any book, written by an angler for anglers, with so much pleasure as Mr. Skues's "Minor Tactics of the Chalk Stream." The polemics of ardent advocates of the dry fly or the wet fly may instruct, and possibly convert, but they weary the reader; the object of the present book is to advance no theory, but to make the angler approach his subject (and his trout) with an open mind, and think out for himself the problems with which he is confronted. Herein, we conceive, lies the true value of the book. The scene is laid upon the banks of a chalk stream, or of some carrier in the water-meadows that holds dark, hog-backed trout; for setting we have the willows and lush herbage of a southern valley, while the reed warbler, the dabchick, and the corn-crake, are cast for minor parts; yet there is counsel which we would commend to those whose waters run through heather and bog-myrtle, where the trout are small, with fair golden bellies and ring-spotted sides, and the angler's music is the sweet spring cry of the curlew or the drumming of the snipe.

It is of the essence of Mr. Skues's teaching that the angler should cast aside the dogmas of his predecessors, and should study nature for himself; nature as seen in the trout, and on the banks of the stream, and, above all, in the life-histories of the insects eaten by the trout. There is no dogmatism here, but a pleasant didactic manner, instructing while it amuses, and amusing when it does not instruct; the moral is pointed by tales of full baskets or of bad days (our author's methods seem to have eliminated blanks), and there are constant reminders that bring the reader from his theories straight back to the river's bank. We may learn how to tie flies in imitation of the nymphs of Ephemerids, and how to fish with them, of an effort to reproduce the alder-fly lava and its results, and of the sad fate of the artificial fresh-water shrimp; we may further read of the undoing of trout that bulge or tail, of trout that live in strange and unapproachable holes, and of those gourmet trout whose tastes need humouring.

The temptation to quote from Mr. Skues is irresistible, the difficulty is to select; whether to reproduce his tale of the day on which there was no rise of fly but a strong rise of water-rats, or his comments on flies, or on human nature and its reluctance to jeopardise a shilling cast and twopenny fly for the sake of getting a fish out of some weedy or bushy hole. Here, for instance, is one comment with which we cordially agree:—"Indeed, why a trout should take any artificial fly is a puzzle to me. The very best are not really very like the real things. One thing is clear: It is not form which appeals to the trout, but colour and size." In the light of this passage, the flies shown on the frontispiece should be studied and compared with the actual flies and nymphs.

Throughout the book the same ruling idea is found; the preaching of no system, the upholding of no tradition, but a plea for "unfettered judgment, independence of tradition, and, above all, the inquiring mind." We wish Mr. Skues success in his campaign; incidentally we wish him many readers, and we wish his readers many more such books as this. But when these books come let them be indexed; good advice is elusive, and captions alone are not always sufficient guides. L. W. B.

ZOOLOGICAL STUDIES.

Studies from the Zoological Department, University of Birmingham. Vol. ii. Edited by Prof. F. W. Gamble, F.R.S. (1910.)

THIS volume consists of reprints of sixteen papers from various journals, the outcome of work done in the years 1905–9 by the staff and students of the zoological department of the University of Birmingham. It is appropriate that the first paper in the volume should be one by the late head of the depart-

ment—Prof. T. W. Bridge—and that it should deal with a subject which he had made peculiarly his own, namely, the air-bladder of fishes. The main purpose of this interesting paper is to consider this remarkable organ, not from the points of view of morphology and function, though these aspects are not neglected, but as the source of isinglass. The author pointed out that, although there are 7000 or 8000 species of fishes with air-bladders, few are utilised for the supply of isinglass, and he suggested that the air-bladders of some of our larger British food-fishes, such as the cod, hake, gurnard, &c., might be of value for this purpose. Isinglass is apparently the only product of the animal body which can be used as a clarifying agent in brewing operations, and its mode of action does not seem to be at all clearly understood, but it is believed that it depends on the fibrous nature of the substance. The fibres swell out in the liquid, particles become entangled in their meshes, and are carried, with the settling of the isinglass, to the bottom of the barrel.

There is one other contribution from the pen of the late Prof. Bridge, probably his last published work, on the presence of a false acetabulum in a Bandicoot. Dislocation of the head of the right femur resulted in the formation of a false socket on that side of the pelvic girdle, dorsal to and closely resembling the normal acetabulum, which latter had undergone retrogressive modification as the result of the loss of function.

Half the remaining papers in this volume are concerned with fishes—Mrs. Merritt Hawkes records the presence of a vestigial sixth branchial arch in the Heterodontidæ, describes the cranial and spinal nerves, the abdominal viscera, and a vestigial seventh branchial arch of Chlamydoselachus, and gives a useful account of the theory of nerve components; Mr. A. D. Imms describes the gill-rakers of the spoonbill, and the oral and pharyngeal denticles of Elasmobranchs; and Mr. R. H. Whitehouse discusses the morphology of caudal fins, directing attention to the effects of specialisation, especially abbreviation, of the axis and restriction of the caudal fin in homocercal tails, and concluding that the present homocercal caudal fin is really a posterior anal which owes its present position to the great abbreviation of the axis coupled with excessive upturning of the end of the chorda.

There are further contributions from Mr. Imms on Anurida (being his L.M.B.C. memoir on this Collembolan), and on the occurrence at Port Erin of a pseudo-scorpion (*Obisium muscorum*) in the fissures of rocks in such positions that the specimens had to endure submersion twice daily. The studies also include papers on sex-inheritance in the moth *Abraxas grossulariata* and its variety *lacticolor*, and on animal parthenogenesis, by Mr. L. Doncaster; on the anatomy of the "green fly" of rose trees by Mr. A. J. Grove, and on the gonadial grooves of Aurelia by Mr. T. Goodey.

The studies bear testimony to the range of view of the late professor and to his stimulating influence on his pupils.

OUR BOOK SHELF.

Physiology of the Special Senses. By M. Greenwood, Jun. Pp. vii+239. (London: Edward Arnold, 1910.) Price 8*s.* 6*d.* net.

IN trite phraseology, this book supplies a long-felt want, and supplies it in a manner which is altogether commendable. It is elementary, but not so elementary as merely to traverse the same ground as that covered inefficiently in so many text-books. In reading the chapters devoted to the special senses in many text-books of physiology, one feels irresistibly that the author is out of sympathy with the subject. In this book the physiology of the special senses is introduced to the reader with illuminating clearness born of thorough knowledge and judicial discrimination. The requirements of the student are catered for by a teacher who knows how to interest his audience, but at the same time demands an attentive application of intelligence. Thought is stimulated, and the desire for further knowledge evoked. Each chapter concludes with a short but well-selected bibliography, pointing out the path for further study.

After an introduction dealing with the laws of Müller, Weber and Fechner, cutaneous sensation, taste and smell, the sense of position and movement, hearing, vision, and the physiology of space come successively under review. The work of Head and his collaborators, Rivers, Sherren, Ham and Thompson, upon protopathic and epicritic sensibility is clearly described, whilst the subsequent researches of Trotter and Davies are discussed and criticised. Taste and smell, the sense of position and movement, and hearing are adequately treated, but, as was to be expected, the physiology of vision in its manifold and complex manifestations demands the major part of the book, more than half the pages being devoted to its consideration.

After a chapter on the comparative physiology of vision, retinal processes, electrical, phototropic and chemical responses are dealt with. The student is led on in logical sequence to visual adaptation, entailing a discussion of peripheral vision and total colour-blindness. The chapter on recurrent vision theories of adaptation gives the reader ample food for reflection, and in entering upon the thorny subject of trichromatic vision the author wisely quotes the warning words of Helmholtz:—"The confession of actual doubt is better than the delusion of dogmatic certainty."

The treatment of colour-vision and colour-blindness is admirable. Expanded and treated more exhaustively in the same judicial spirit it might form a valuable corrective to the obsessions which the subject seems almost inevitably to induce. Further chapters are devoted to after images, historical theories of vision, the Young-Helmholtz theory, Hering's theory, and simultaneous contrast.

Reminiscences of a Strenuous Life. By Prof. Edward Hull, F.R.S. Pp. iv+119. (London: Hugh Rees, Ltd., 1910.) Price 4*s.* 6*d.* net.

THOUGH nothing appears in this simple record to justify the adjective in the title, it will afford to many a pleasant reminder of a life still keen and active, yet bridging the years between Thomas Oldham's lectures in Dublin and the Darwin celebration of 1909. Dr. Hull originally studied at Trinity College, Dublin, with the view of becoming a clergyman of the Church of Ireland, and it is interesting to note that a course in the Irish language then formed a part of the recognised curriculum. Having, however, been attracted by engineering, he came under Oldham's influence, and, with his aid, began work on